CLAIMS:

1. An exhaust gas control apparatus for an internal combustion engine, characterized by comprising:

a NOx storage reduction catalyst which is provided in an exhaust passage for an internal combustion engine;

detection means for detecting a total concentration of sulfur oxide and hydrogen sulfide in exhaust gas that has passed through the NOx storage reduction catalyst, and a concentration of the sulfur oxide in the exhaust gas; and

poisoning recovery control means for performing a poisoning recovery process that controls an operating state of the internal combustion engine such that the sulfur oxide is released from the NOx storage reduction catalyst, wherein

when a concentration of the hydrogen sulfide obtained based on the total concentration and the concentration of the sulfur oxide that are detected by the detection means during the poisoning recovery process exceeds a permissible limit, the poisoning recovery control means controls the operating state of the internal combustion engine such that the sulfur oxide is released from the NOx storage reduction catalyst, an amount of the released sulfur oxide is in a predetermined range, and the concentration of the hydrogen sulfide is reduced.

2. The apparatus according to claim 1 , wherein when the concentration of the hydrogen sulfide exceeds the permissible limit, the poisoning recovery control means controls the operating state of the internal combustion engine such that the amount of the sulfur oxide released from the NOx storage reduction catalyst is equal to or larger than a lower limit value of the predetermined range, and the concentration of the hydrogen sulfide is equal to or lower than the permissible limit.

3. The apparatus according to claim 1 or 2, wherein the poisoning recovery control means controls the operating state of the internal combustion engine such that the

concentration of the hydrogen sulfide is reduced, by performing at least one of a process of increasing an exhaust gas air-fuel ratio in a rich air-fuel ratio range, and a process of decreasing a temperature of the NOx storage reduction catalyst in a temperature range in which the sulfur oxide is released.

4. The apparatus according to claim 3, wherein the poisoning recovery control means increases the exhaust gas air-fuel ratio by performing at least one of a process of increasing an amount of intake air, a process of decreasing an EGR amount, and a process of decreasing an amount of fuel supplied to a portion upstream of the NOx storage reduction catalyst.

5. The apparatus according to any one of claims 1 to 4, wherein when the concentration of the hydrogen sulfide is lower than the permissible limit, the poisoning recovery control means controls the operating state of the internal combustion engine such that the amount of the sulfur oxide released from the NOx storage reduction catalyst is increased.

6. The apparatus according to claim 5, wherein the poisoning recovery control means controls the operating state of the internal combustion engine such that the amount of the released sulfur oxide is increased, by performing at least one of a process of decreasing an exhaust gas air-fuel ratio, and a process of increasing a temperature of the NOx storage reduction catalyst.

7. The apparatus according to claim 6, wherein the poisoning recovery control means decreases the exhaust gas air-fuel ratio by performing at least one of a process of decreasing an amount of intake air, a process of increasing an EGR amount, and a process of increasing an amount of fuel supplied to a portion upstream of the NOx storage reduction catalyst.

8. The apparatus according to any one of claims 1 to 7, wherein when the concentration of the sulfur oxide detected by the detection means has decreased to a predetermined lower limit value, the poisoning recovery control means controls the operating state of the internal combustion engine such that the amount of the released sulfur oxide is increased.

9. An exhaust gas control method for an internal combustion engine, characterized by comprising:

performing a poisoning recovery process that controls an operating state of an internal combustion engine such that sulfur oxide is released from a NOx storage reduction catalyst provided in an exhaust passage for the internal combustion engine,

detecting a total concentration of sulfur oxide and hydrogen sulfide in exhaust gas that has passed through the NOx storage reduction catalyst during the poisoning recovery process;

detecting a concentration of the sulfur oxide in the exhaust gas that has passed through the NOx storage reduction catalyst during the poisoning recovery process;

calculating a concentration of the hydrogen sulfide based on the total concentration and the concentration of the sulfur oxide that are detected; and

controlling at least one of exhaust gas that flows into the NOx storage reduction catalyst and a state of the NOx storage reduction catalyst such that the sulfur oxide is released from the NOx storage reduction catalyst, an amount of the released sulfur oxide is in a predetermined range, and the concentration of the hydrogen sulfide is reduced when the concentration of the hydrogen sulfide exceeds a permissible limit.